

SCOPE OF CLAIMS

1. An X-ray tube device having an anode rotation mechanism for rotating an anode with a motor, further comprising: an anode rotation number detecting means for detecting the rotation number of the anode on the basis of information of voltage and current or of current only related to a stator coil for generating a rotating magnetic field to rotate the motor.

2. An X-ray tube device according to claim 1, wherein the anode rotation number detecting means includes: at least one voltage detecting means for detecting voltage of the stator coil; at least one current detecting means for detecting current flowing through the stator coil; impedance calculating means for calculating impedance of the anode rotation mechanism using an output of the voltage detecting means and the current detecting means; predetermined impedance storing means for storing an impedance of the anode rotation mechanism corresponding to a predetermined rotation number of the anode; and means for comparing the predetermined impedance with a present impedance calculated by the impedance calculating means and detecting that the present impedance is around the predetermined impedance.

3. An X-ray tube device according to claim 1, wherein the anode rotation number detecting means includes: at least one voltage detecting means for detecting voltage of the stator coil; at least one current detecting means for detecting current flowing through the stator coil; impedance calculating means for calculating impedance of the anode rotation mechanism using an output of the voltage detecting means and the current detecting means; initial impedance storing means for storing an impedance at the start of anode rotation calculated by the impedance calculating means; impedance ratio calculating means for calculating a ratio between the initial impedance and a present impedance

calculated by the impedance calculating means; and means for detecting an event that the rotation number of the anode is a predetermined rotation number on the basis of the impedance ratio calculated by the impedance ratio calculating means.

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4. An X-ray tube device according to claim 1, wherein the anode rotation number detecting means includes: at least one current detecting means for detecting current flowing through the stator coil; preset stator coil current storing means for storing a stator coil current corresponding to a preset rotation number of the anode; and means for detecting an event that an present stator coil current is around the predetermined stator coil current by comparing the stored stator coil current and the stator coil current obtained by the current detecting means.

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5. An X-ray tube device according to claim 1, wherein the anode rotation number detecting means include: at least one current detecting means for detecting current flowing through the stator coil; initial stator coil current storing means for storing a stator coil current at the start of anode rotation detected by the current detecting means; stator coil current ratio calculating means for calculating a ratio between the initial stator coil current and the present stator coil current detected by the current detecting means; and means for detecting an event that the rotation number of the anode is the predetermined rotation number using the stator coil current ratio obtained by the stator coil current ratio calculating means.

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6. An X-ray tube device according to claim 2 or 3, wherein among voltage and current information related to the stator coil and input into the impedance calculating means, the voltage information is a target value of the voltage.

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7. An X-ray generating device comprising: an X-ray tube device having an

anode rotation mechanism; an X-ray high voltage generating device for generating a DC high voltage to be applied between an anode and a cathode of the X-ray tube device; and X-ray radiation start commanding means for receiving output voltage of the X-ray high voltage generating device between the anode and the cathode of the X-ray tube device when the rotation number of the anode reaches a predetermined number and outputting a command to generate X-ray from the X-ray tube device, wherein the X-ray tube device is one according to any of claim 1 to 5.

8. An X-ray generating device comprising: an X-ray tube device having an anode rotation mechanism; an X-ray high voltage generating device for generating a high voltage to be applied between an anode and a cathode of the X-ray tube device; and an X-ray radiation start commanding means for receiving output voltage of the X-ray high voltage generating device between the anode and the cathode of the X-ray tube device when the rotation number of the anode reaches a predetermined number and a outputting command to generate X-rays from the X-ray tube device, wherein the X-ray tube device is one according to claim 6.

9. An X-ray imaging apparatus using an X-ray generating device according to claim 7.

10. An X-ray imaging apparatus using an X-ray generating device according to claim 8.

11. An X-ray radiation determiner comprising: an anode rotation number detecting means for detecting the rotation number of an anode on the basis of voltage and current information or only current information related to a stator coil for generating a rotating magnetic field to rotate a motor when X-rays is radiated

from an X-ray tube device having an anode rotation mechanism for rotating the anode with the motor.

12. An X-ray radiation determiner according to claim 11, wherein the anode rotation number detecting means includes: at least one voltage detecting means for detecting voltage of the stator coil; at least one current detecting means for detecting current flowing through the stator coil; impedance calculating means for calculating impedance of the rotary anode mechanism using an output of the voltage detecting means and the current detecting means; predetermined impedance storing means for storing an impedance of the rotary anode mechanism corresponding to a predetermined rotation number of the anode; and means for comparing the predetermined impedance with a present impedance calculated by the impedance calculating means and detecting that the present impedance is around the predetermined impedance.

13. An X-ray radiation determiner according to claim 11, wherein the anode rotation number detecting means includes: at least one voltage detecting means for detecting voltage of the stator coil; at least one current detecting means for detecting current flowing through the stator coil; impedance calculating means for calculating impedance of the rotary anode mechanism using an output of the voltage detecting means and the current detecting means; initial impedance storing means for storing impedance at the start of anode rotation calculated by the impedance calculating means; impedance ratio calculating means for calculating a ratio between the initial impedance and a present impedance calculated by the impedance calculating means; and means for detecting an event that the rotation number of the anode is the predetermined rotation number on the basis of the impedance ratio calculated by the impedance ratio calculating means.

14. An X-ray radiation determiner according to claim 11, wherein the anode rotation number detecting means includes: at least one current detecting means for detecting current flowing through the stator coil; preset stator coil current storing means for storing stator coil current corresponding to a preset rotation number of the anode; and means for detecting that the present stator coil current is around the predetermined stator coil current by comparing the stored stator coil current with the stator coil current calculated by the current detecting means.

15. An X-ray radiation determiner according to claim 11, wherein the anode rotation number detecting means includes: at least one current detecting means for detecting current flowing through the stator coil; initial stator coil current storing means for storing a stator coil current at the start of anode rotation detected by the current detecting means; stator coil current ratio calculating means for calculating the initial stator coil current and a present stator coil current detected by the current detecting means; and means for detecting an event that the rotation number of the anode is a predetermined rotation number from a stator coil current ratio calculated by the stator coil current ratio calculating means.

16. An X-ray radiation determiner according to claim 12 or 13, wherein among voltage and current information related to the stator coil and input into the impedance calculating means, the voltage information is a target value of the voltage.

17. An X-ray generating device comprising: an X-ray tube device having an anode rotation mechanism; an X-ray high voltage generating device for generating DC high voltage to be applied between an anode and a cathode of the X-ray tube device; X-ray radiation start commanding means for receiving an output voltage of the X-ray high voltage generating device between the anode

and the cathode of the X-ray tube device when the rotation number of the anode reaches a predetermined number and outputting command to generate X-rays from the X-ray tube device; and an X-ray radiation determiner according to any of claim 11 to 15.

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18. An X-ray generating device comprising: an X-ray tube device having an anode rotation mechanism; an X-ray high voltage generating device for generating DC high voltage to be applied between an anode and a cathode of the X-ray tube device; X-ray radiation start commanding means for receiving output
10 voltage of the X-ray high voltage generating device between the anode and the cathode of the X-ray tube device when the rotation number of the anode reaches a predetermined number and outputting a command to generate X-ray from the X-ray tube device; and an X-ray radiation determiner according to claim 16.

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19. An X-ray imaging apparatus using an X-ray generating device according to claim 17.

20. An X-ray imaging apparatus using an X-ray generating device according to claim 18.

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